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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/507,542	02/18/2000	Joseph K. Davidson	P950	8012

7590 08/02/2004

Daniel L Dawes
Myers Dawes & Andras LLP
5252 Kenilworth Drive
Huntington Beach, CA 92649

EXAMINER

GARCIA OTERO, EDUARDO

ART UNIT PAPER NUMBER

2123

DATE MAILED: 08/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/507,542

Applicant(s)

DAVIDSON ET AL.

Examiner

Eduardo Garcia-Otero

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 16-19 and 21-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-12, 16-19, 21-23, and 25-28 is/are allowed.
- 6) ☒ Claim(s) 24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION: Final Action

Introduction

1. Title is: METHOD AND APPARATUS FOR GEOMETRIC VARIATIONS TO INTEGRATE PARAMETRIC COMPUTER AIDED DESIGN WITH TOLERANCE ANALYSIES AND OPTIMIZATION
2. First named inventor is: DAVIDSON
3. The pending claims are 1-12, 16-19, 21-28.
4. Applicant's Request for Continued Examination was received 6/28/04, and amends claims 1, and 7.
5. Applicant claims priority to U.S. Provisional application serial No. 60/120,961 filed Feb. 19, 1999.

Index

6. **Iannuzzi** refers to US Patent 5,586,052.
7. **Hoppe** refers to US Patent 6,137,492.
8. **Krishnamurthy** refers to US Patent 6,256,039.
9. **Ballas** refers to US Patent 4,800,652.
10. **Carlstrom** refers to US Patent 5,875,264.
11. **Rose** refers to US Patent 5,574,468.
12. **Kedem** refers to US Patent 4,649,498.
13. **Kamiguchi** refers to US Patent 5,549,857.
14. **Kandikjan** refers to "A mechanism for validating dimensioning and tolerancing schemes in CAD systems", by T. Kandikhan et. al., Computer-Aided Design 33 (2001) 721-737.
15. **Maxey** refers to New Riders' Reference Guide to AutoCAD 13, by Randall A. Maxey et. al., New Riders Publishing, 1995, ISBN 1-56205-237-3, pages 227-229 (DIM), pages 227-284 (DVIEW), 674-679 (TOLERANCE and parallelism).
16. **McGraw-Hill Dictionary** refers to The McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition, by McGraw-Hill Companies, Inc., ISBN 0-07-042313-X, 2003:
17. **barycentric coordinates** "The coefficients in the representation of a point in a simplex as a linear combination of the vertices of the simplex."

Art Unit: 2123

18. **simplex** "An n -dimensional simplex in a Euclidean space consists of $n + 1$ linearly independent points... a triangle with its interior and a tetrahedron with its interior are examples."

Claim Interpretation

19. It appears efficient to discuss claim interpretation before addressing the Applicant's remarks.

20. Claim 1 (currently amended) explicitly appears to claim a 6 level logical or organizational hierarchical structure.

- [1]-OBJECT LEVEL. One or more objects.
- [2]-FEATURE LEVEL. Each object may contain one or more features.
- [3]-ZONE LEVEL. Each feature may contain one or more tolerance zones.
- [4]-FORM LEVEL. Each tolerance zone contains exactly one algebraic form and exactly one geometric form.
- [5]-MAP LEVEL. Each geometric form contains exactly one tolerance map.
- [6]-SUBMAP LEVEL. Each tolerance map may contain one or more submaps.

21. Note that each tolerance zone contains exactly one geometric form, and each geometric form contains exactly one tolerance map. Thus, each tolerance zone contains (indirectly) exactly one tolerance map. In other words (from top down): there may be multiple objects, each object may have multiple features, each feature may have multiple tolerance zones, and each tolerance zone has exactly one tolerance map (indirectly) and may have multiple submaps (indirectly).

APPLICANT'S REMARKS

22. Applicant's amendments (to claims 1 and 7) and remarks persuasively overcome all pending rejections with respect to claims 1-12, 16-19, 21-23, and 25-28. In other words, independent claim 1 and all its dependent claims are allowable.

23. However, Applicant's assertions regarding claim 24 at Remarks page 19-20 are not persuasive. Specifically, Applicant appears to interpret the terms of claim 24 as including additional limitations which are not explicitly stated in claim 24. The limitations of claim 24 are broad, and are disclosed by the cited prior art.

Art Unit: 2123

24. If claim 24 were amended such that one of the claimed modules included the limitations of independent claim 1, then claim 24 (amended) would be allowable.

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action: (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
26. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: Determining the scope and contents of the prior art. Ascertaining the differences between the prior art and the claims at issue. Resolving the level of ordinary skill in the pertinent art. Considering objective evidence present in the application indicating obviousness or nonobviousness.
- 27. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable.**
28. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission (commercial software) in view of Maxey (AutoCAD).
29. Claim 24 is an independent claim with 10 limitations, A-J.
30. **A-geometry engine module E1** is disclosed by Applicant's Admission at specification page 18 "commercial software... a geometry engine (ACIS, e.g. parasolid or DesignBase)".
31. **B-constraint solver E2** is disclosed by Applicant's Admission at specification page 18 "commercial software... a constraint solver (e.g. D-Cubed DCM, 2D/3D, design sheet or MAPLE)".
32. **C-geometry definition system M1** is disclosed by Applicant's Admission at specification page 18 "commercial software... a geometry engine (ACIS, e.g. parasolid or DesignBase)". Note that specification page 45 states "The procedure for creating such a system from commercially available... is well known".
33. **E-tolerancing module M4** is disclosed by Applicant's Admission at specification page 18 "commercial software... tolerance analysis packages (e.g. Mech. Advantage, VSA-3D)".
34. **H-tolerance allocation module M6** is disclosed by Applicant's Admission at specification page 18 "commercial software... tolerance analysis packages (e.g. Mech. Advantage, VSA-3D)".

Art Unit: 2123

35. **J-statistical tolerance analysis package E2** is disclosed by Applicant's Admission at specification page 18 "commercial software... tolerance analysis packages (e.g. Mech. Advantage, VSA-3D)".
36. Applicant's Admission (commercial software) does not explicitly disclose the additional limitations.
37. **D-dimensioning module M2** is disclosed by Maxey page 227 "dimensioning mode".
38. **F-global visualization module M3** is disclosed by Maxey page 277 "dynamic view".
39. **G-a D&T [datum and targets] Schema Advisor module M5** is disclosed by Maxey page 675 "geometric dimensioning and tolerance control frames".
40. **I-local module visualization module M7** is disclosed by Maxey page 277 "dynamic view".
41. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Maxey to modify Applicant's Admission.
42. One of ordinary skill in the art would have been motivated to do this because Maxey (AutoCAD) serves as a modeling platform upon which to add commercial software modules for constraint, geometry, and tolerance.

Patentable material

43. Claims 1-12, 16-19, 21-23, and 25-28 are allowable.
44. Specifically, independent claim 1 is allowable because no prior art teaches organizing tolerance data using a 6 level hierarchical system comprising:
 - [1]-OBJECT LEVEL. One or more objects.
 - [2]-FEATURE LEVEL. Each object may contain one or more features.
 - [3]-ZONE LEVEL. Each feature may contain one or more tolerance zones.
 - [4]-FORM LEVEL. Each tolerance zone contains exactly one algebraic form and exactly one geometric form.
 - [5]-MAP LEVEL. Each geometric form contains exactly one tolerance map.
 - [6]-SUBMAP LEVEL. Each tolerance map may contain one or more submaps.
45. Dependent claims 2-12, 16-19, 21-23, and 25-28 are allowable because they depend from allowable independent claim 1, and add further limitations.

Art Unit: 2123

46. Claim 24 is not allowable.

Conclusion

47. Claims 1-12, 16-19, 21-23, and 25-28 are allowable. In other words, independent claim 1 and its dependent claims are allowable.

48. Claim 24 is rejected under 35 USC 103. Claim 24 would be allowable if amended such that one of the modules included the limitations from independent claim 1.

Communication

49. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 8:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone number for this group is 703-872-9306.

50. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

* * *



KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER